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A THIRD SUBAPTEROUS CRANE FLY FROM HAWAII (DIPTERA: TIPULIDAE)[1]

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Abstract.—*Limonia* (*Dicranomyia*) *gloria*, a flightless crane fly, is described, illustrated and compared with other subapterous crane flies from Hawaii and with fully winged, supposedly near relatives.

Key Words: *Limonia*, flightless, Tipulidae, Limoniinae, Hawaii

Most reduction in the wings in crane flies is seen in species that reach the adult stage in winter or that live under cold climatic conditions, such as in arctic or subarctic regions or in high mountains (Byers 1969). Even the exceptional flightless, subapterous species occurring on temperate or tropical islands have been found only near the highest elevations on those islands. In Hawaii, two such species have been found: *Limonia* (*Dicranomyia*) *sabroskyana* Byers on the Wainiha Pali (1225 m) in central Kauai, and *L.* (*D.*) *hardyana* Byers on the highest peaks and ridges of the Koolau Range of eastern Oahu. Recently, a third flightless Hawaiian crane fly has been found, at the summit of Mount Kaala, the highest peak on Oahu, in the Waianae Mountains, toward the western side of the island.

Limonia (Dicranomyia) gloria, New Species

(Figs. 1–5)

Description based on three males and two females, preserved in alcohol (all but one male partially cleared by preservative or by chemical maceration).

General appearance, especially of males, phalangid-like because of the extremely reduced wings, short body and very long, slender legs; strong sexual dimorphism in length of legs, those of males nearly three times as long as those of females.

Body length, excluding antennae: male, 4.1–4.7 mm (holotype 4.7 mm); female, 3.3–3.9 mm (allotype 3.3 mm).

Head: Eyes somewhat reduced, with approximately 100 ommatidia in male and 90 in female, widely separated at vertex by more than width of eye in frontal aspect. Dorsum of head slightly darker brown than thoracic dorsum, with about 20 sparsely-distributed, forwardly-curved setae on vertex. Head behind eyes only about as long as width of eye in lateral aspect; 2 or 3 short setae on gena behind each eye. Rostrum short, including labellar lobes only about as long as scape and pedicel together. Antennae with cylindrical scape, ovoid pedicel and 12 moniliform flagellomeres. Antennal length, male, 0.85–0.95 mm (holotype 0.85 mm), female 0.80 mm.

Thorax: Dorsum brown, pleural sclerites and coxae paler brown. Antepronotum elongate medially, narrowed at sides, nearly

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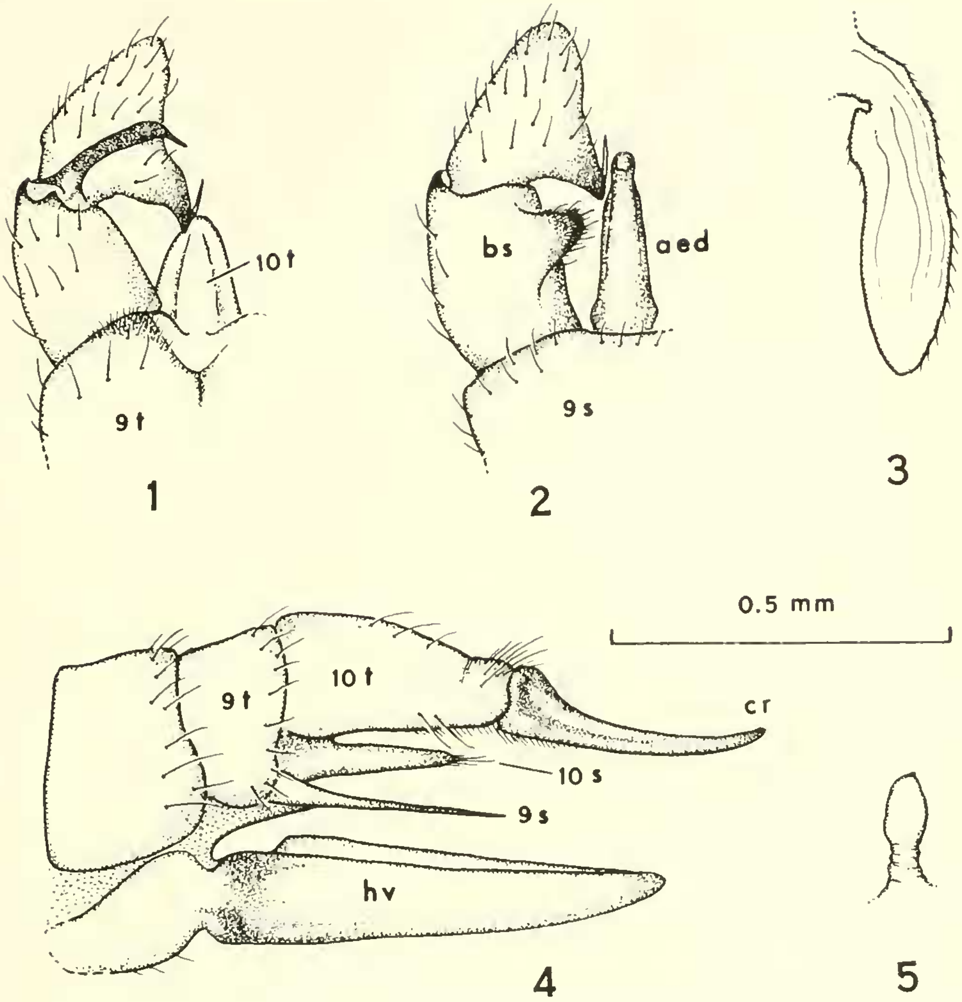

Figs. 1–5. *Limonia* (*Dicranomyia*) *gloria*. 1, right basistyle, dististyles and adjacent terga, male, dorsal aspect; 9t—ninth abdominal tergum, 10t—tenth tergum (proctiger). 2, left basistyle and ventral dististyle and adjacent structures, male, ventral aspect; aed—aedeagus, bs—basistyle, 9s—ninth sternum. 3, right wing, male, dorsal aspect. 4, terminal abdominal segments, female, left lateral aspect; cr—cercus, hv—hypovalve, 9s—ninth sternum, 9t—ninth tergum, 10s—tenth sternum, 10t—tenth tergum. 5, haltere, male, left lateral aspect. Scale, all figures.

perpendicular to dorsal surface of scutum, thus head and neck inclined downward; longest setae of antepronotum near anterior and posterior margins. Postpronotum extremely short, transverse. Cervical sclerites long, slender, with short projection at angular bend slightly behind mid-length. Scutum-prescutum with setae shorter than those on pronotum, most in two poorly-defined longitudinal rows; three setae on each slightly elevated scutal area beside wing base. Scutellum and mesonotal postnotum with sparse marginal setae. Wings rudimentary (Fig. 3), about 3.5 times as long as their greatest width, with short setae along costal margin and without any distinct venation. Halteres (Fig. 5) short, with only slightly enlarged capitulum (somewhat pointed apically in some individuals) and thick, wrinkled pedicel. Legs strongly dimorphic in

Table 1. Comparison of length of legs and tarsi in males and females of *Limonia* (*Dicranomyia*) *gloria*. Measurements are means, where appropriate, of attached legs only (many legs missing from specimens or present with specimens but broken off).

	Fore Leg	Middle Leg	Hind Leg
Male			
Femur	4.4 mm	4.3 mm	4.0 mm
Tibia	5.4	4.8	5.3
Tarsus	5.8	5.3	5.3
Total	15.6 mm	14.4 mm	14.6 mm
Female			
Femur	1.8	2.1	1.9
Tibia	1.9	2.4	1.9
Tarsus	1.8	2.1	1.7
Total	5.5 mm	6.6 mm	5.5 mm

length, those of males nearly three times as long as those of females (Table 1); in males, forelegs longest, in females middle legs longest. Basitarsi in males about 1.5 times length of tarsomeres 2–5 combined. All coxae approximately of equal size. Femora of only slightly greater diameter at apex than at base, uniform in color, without dense hairs.

Abdomen of male: Terga and sterna evenly light brown to brown, with hairs mainly along lateral and posterior margins; pleura darker brown to grayish brown (darker than sclerites even in cleared specimens). Tergum 9 bilobed (Fig. 1), apices of lobes darkened; low, pigmented ridges from apex of each lobe converging to form V-shaped separation between lobes; nonpigmented ridges extending from apices of lobes onto dorsal surface of semimembranous tergum 10 (base of anal segment). Ventromesal lobe of basistyle (Fig. 2) only about as long as its width at base, rounded at apex. Dorsal dististyle (Fig. 1) not strongly curved until near attenuate tip. Ventral dististyle thick at base, narrowly rounded at apex, its rostrum short, stout, with single subterminal spine borne on low basal tubercle; spine of medium length for subgenus, not darkly sclerotized. Aedeagus nearly straight, curved slightly ventrad near apex. Gonapophyses slender, rod-like, with upturned tips.

Abdomen of female: Color presumably as in male (both females cleared). Cerci (Fig. 4) light amber-brown except more intensely sclerotized and nearly black near base, short, only slightly curved upward. Hypovalves light amber-brown, narrowly darker along lower and upper edges and blackened near base. Ninth sternum greatly elongated, slender, sharply tipped. Tenth sternum thick, deeply separated from tergum 10, truncate posteriorly with few elongate apical setae.

Types: Holotype, male, "collected in a pitfall trap" in a bog on Mt. Kaala, elevation 4000 ft. (about 1220 m), 18–26 May 1991, by W. D. Perreira; in collection of University of Hawaii, Honolulu. Allotype and 1 male, 1 female paratypes with same collection data and repository as for holotype. One male paratype, "Mt. Kaala, summit bog, walking on bog floor over leaf litter," 12 August 1991, D. J. Preston; in Bishop Museum, Honolulu (BPBM Accession number 1992.087).

This species is named for my wife, who has little interest in insects but who came from her home in Hawaii to live in Kansas, where she has patiently tolerated my entomological interest for many years. For euphony, her name is a noun in apposition rather than in the genitive form.

Relationships: The most striking characteristic of *Limonia* (*D.*) *gloria* is the dimorphism in length of legs; this is not found in any other Hawaiian *Limonia,* nor have I seen it in any species of crane fly in which both sexes are brachypterous, with the exception of *Leptotarsus* (*Longurio*) *byersi* Young and Gelhaus. In that species, however, the dimorphism is less pronounced, the legs of the female being about 55–60 percent as long as those of the male. Within subgenus *Dicranomyia,* a single rostral spine on the ventral dististyle is quite unusual and is seen elsewhere in the Hawaiian fauna only in *L.* (*D.*) *hardyana.* In that species, the ventral dististyle is in other details unlike that in *L. gloria*, particularly in having an evenly rounded apex and a long, slender rostrum with a curved, slender spine. The short, thick-stemmed halteres are another unique feature of *L. gloria*. In the rounded apex of the ventromesal lobe of the basistyle and the short ventral dististyle with short, thick rostrum, *L. gloria* most closely resembles *L.* (*D.*) *jacobus* Alexander, among the Hawaiian Dicranomyias (cf. Hardy 1960, figs. 7a–c). That species, however, is fully winged, has the posterior margin of tergum 9 in the male entire (without lobes separated by a median notch), and has two very short rostral spines arising near mid-length of the rostrum of the ventral dististyle, etc. In the female, the prolongation of the ninth abdominal sternum is unusual but does occur in some other Limonias. The thick sternum 10 attached only basally is something I have not noticed in other species of the genus.

Some characteristics of *L. gloria* mentioned in the description but not usually accorded taxonomic significance are included because they differ from their equivalents in the other two known brachypterous Hawaiian species. Examples are shape of cervical sclerites, relative sizes of coxae, and approximate numbers of ommatidia in the compound eyes.

I have described and discussed elsewhere some structural modifications of the thorax in the brachypterous, montane species of *Limonia* in Hawaii (Byers 1985). It should be noted that in *L. gloria* the scutum is wider, particularly toward its posterior end, than that of *L. hardyana* (cf. Byers 1985, fig. 1). Thus the rudimentary wings are farther apart and have a less dorsal position on the thorax.

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